REPLACEMENT SHEET

Line Interruption Circuit Detailed Configuration

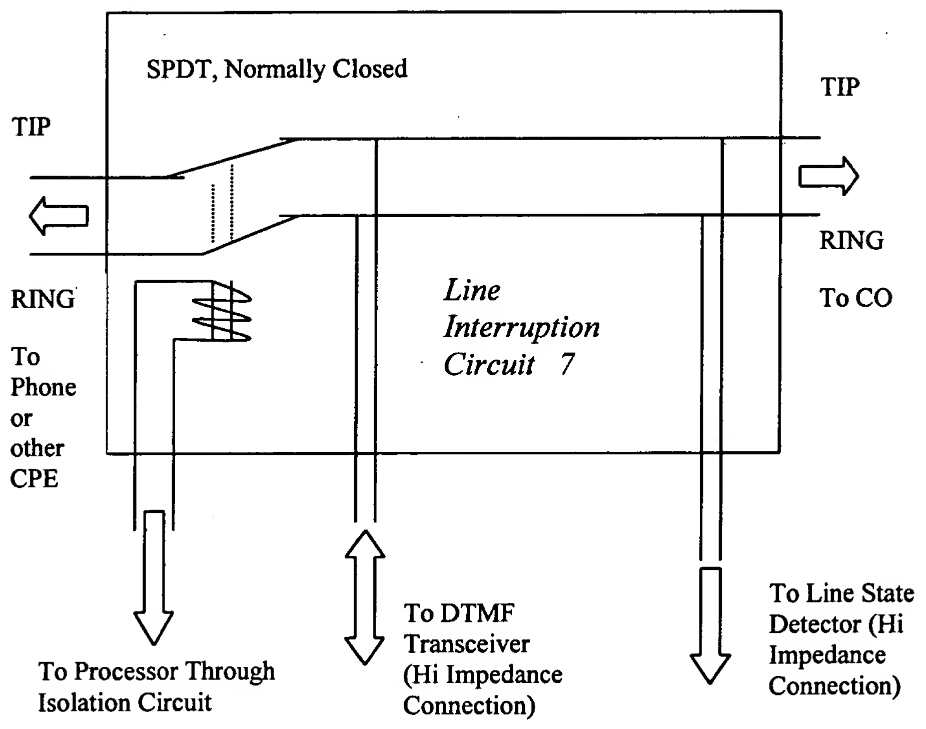
SPDT, Normally Closed
TIP
RING
To Phone or other CPE
TIP
RING
To CO
Line Interruption Circuit 7
To Processor Through Isolation Circuit
To DTMF Transceiver (Hi Impedance Connection)
To Line State Detector (Hi Impedance Connection)

Figure 2a

REPLACEMENT SHEET

Intelligent Telephone Prefix Dialer, standalone POTS environment

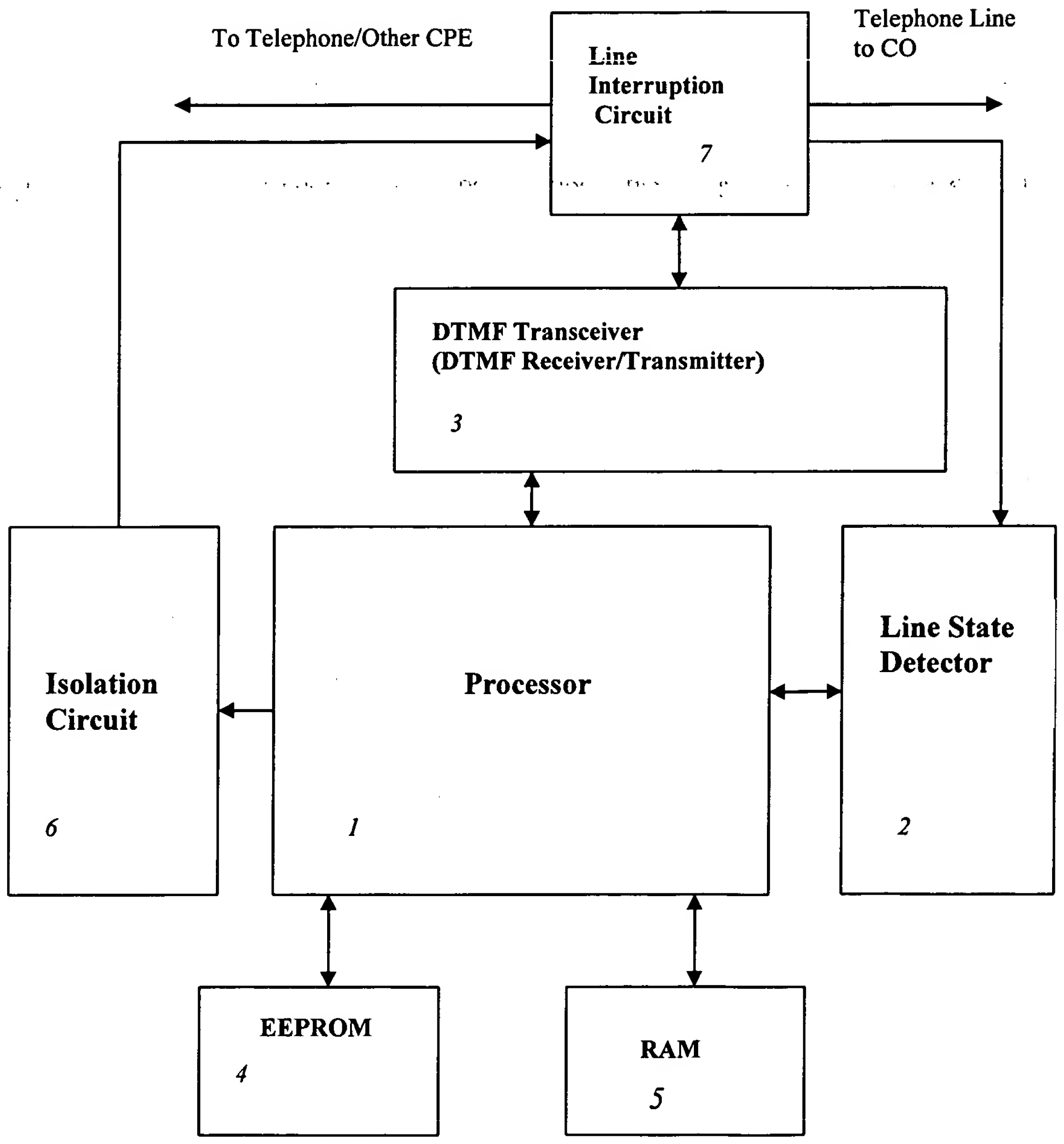

Figure 2b

Intelligent Telephone Prefix Dialer embedded in an ISDN telephone set

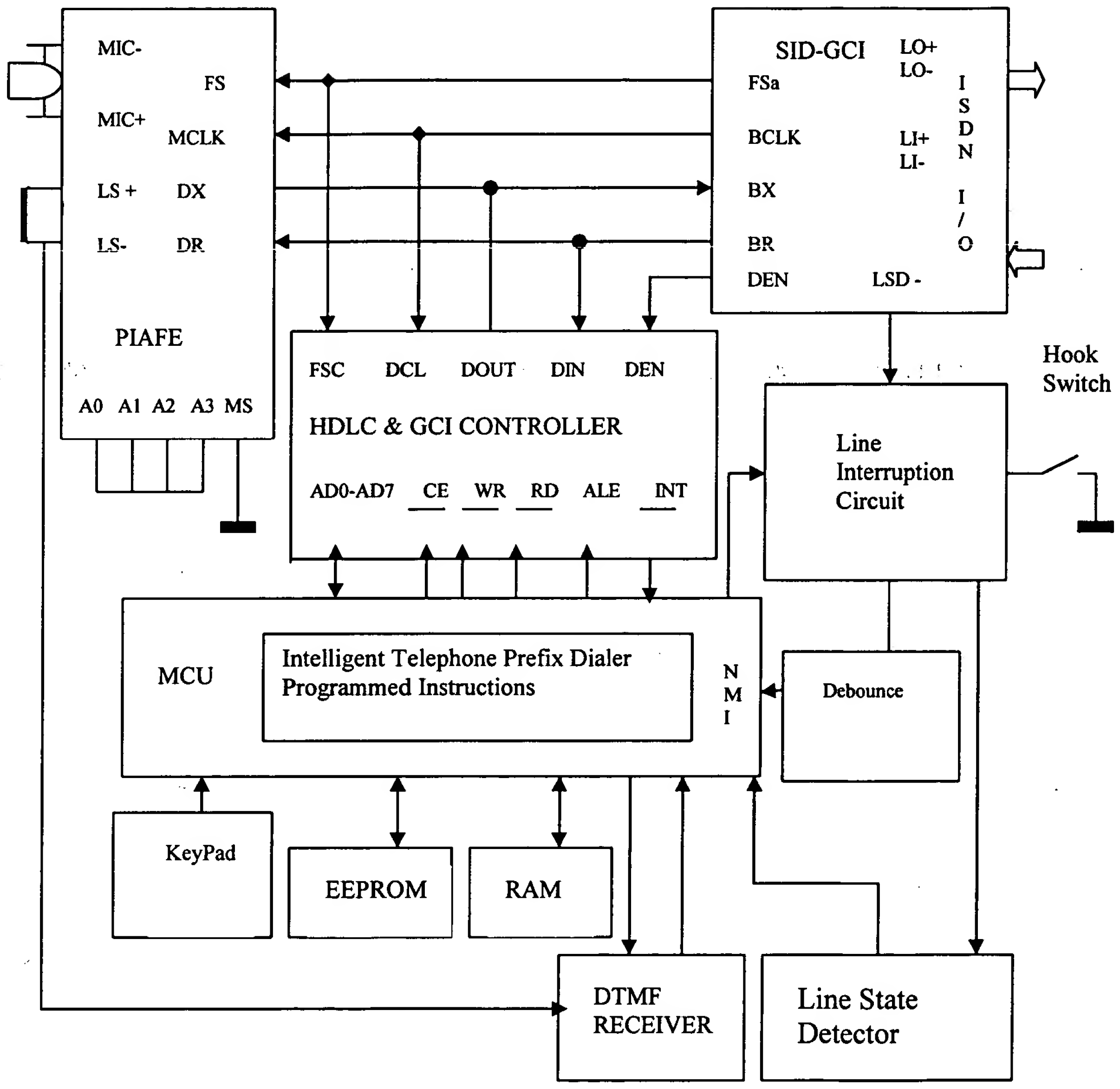

Figure 4

REPLACEMENT SHEET

INTELLIGENT TELEPHONE PREFIX DIALER PSEUDOCODE

Version Beta 3.0

```
Subroutines
        DISPLAYPREFIX@
  LINEMONITOR@
        MONITORLINE@
        CAPTUREDIGITS@
        CAPOPTIONSTRINGS@
        CAPREFIXSTRING@
        FLASHLINE@
        GETNDX@
        CHECK_FOR_TEN@
        DIALNUMBER@
        PARSEOPTIONS@
        PARSESTRING@
Data
        LENGTH                          /* length of table*/
        TABLE                           /*start of table*/
        SUM                             /*sum of digits*/
        COUNT                           /*count of digits*/
        TELNO(8)                        /*user dialed digits*/
        PREFIX                          /*user defined dial prefix*/
        DIALTONE_FLAG                   /*Flag to indicate line state */
                                        /* On Hook = 0, Off Hook = 1*/
                                        /* Line one to Off Hook Line two*/
        DIAL_STRING(10)                 /*The reparsed dial string necessary to complete */
                                        /* the call*/
        USER_REQUEST_FLAG               /*Flag to initiate user input of prefix code*/
        NDX                             /*# Pointer for user TELNO entries
                                        /*intoDIALSTRING*/
        NUMBER_OF_DIGITS_CAPTURED       /*number of digits received by dtmf receiver before*/
                                        /*timeout*/
        ON_HOOK_TIME_COUNTER            /*amount of time that receiver is on hook*/
        BYPASS                          /*bypass bit, if set to 1, bypasses flashook 2 and 3*/
```

Figure 6a

```
Program MAIN
                                        /*Declare and initialize all variables*/
Declare and Intitilize Hardware specific variables for dtmf transceiver and other hardware
Dtmf                                var     byte
Bypass                              var     byte
Dt_flag                             var     bit
Dt_det                              var     INL.bit2        /*Detect bit from dtmf receiver*/
Dialtone_flag       var     bit
Number_of_Digits_Captured           var     byte            /*Range index to telno()*/
Digit               var     byte                /*Index  of digits to dial by autodialer*/
I                   var     word
L                   var     byte
K                   var     bit
Ndx                 var     nib
Gosub  GETNDX                   /*Get ndx from EEPROM*/
For I = 1 to ndx - 1
Get prefix code from EEPROM and place into dial_string(I)
next
GOSUB DISPLAYPREFIX   /*Show the stored dialing prefix*/
CAPDIGITS:
        GOSUB CAPTUREDIGITS  /*Start listening for dial string digits entered by user*/
             If NUMBER_OF_DIGITS_CAPTURED <> (10 – NDX)  + 1 then
              goto INHIBITDIAL
             fi
  GOSUB PARSESTRING             /*Parse the TELNO() into DIAL_STRING()
             Pause 160                  /*Time delay before initiating flash hook sequence*/
     GOSUB FLASHLINE            /*First Flash hook*/
             Pause 700                  /*Time delay before further action*/
             If BYPASS =1 then GOTO SKIP_FLASHES /*2nd and 3rd flash only necessary for 3
                                                 /*way call*/
  GOSUB FLASHLINE               /* 2nd Flash hook*/
             Pause 700                  /*Time delay before further action*/
  GOSUB FLASHLINE               /* 3rd  Flash hook*/
             Pause 700                  /*Time delay before further action*/
```

Figure 6b

```
SKIP_FLASHES:
            pause 700                  /*Time delay before initiate redial*/
    GOSUB DIALNUMBER                   /*Dial the number with the required prefix*/
INHIBITDIAL:
         GOSUB LINEMONITOR                      /*Stay put until line goes onhook*/
    GOSUB MONITORLINE                  /*Stay put until line goes offhook*/

     GOTO CAPDIGITS            /*Start listening for digits again*/


/***************************************************************************/

SUBROUTINE:LINEMONITOR
LOOPDT1:
        Set DIALTONE_FLAG from (Telephone Line) /*0 is ONHOOK, 1 is OFFHOOK*/
                IF DIALTONE_FLAG indicates OFFHOOK then  GOTO LOOPDT1
        Return

/***************************************************************************/

/***************************************************************************/
SUBROUTINE:MONITORLINE
        Initialize ON_HOOK_TIME_COUNTER to Zero
LOOPDT2:
        Set DIALTONE_FLAG from (Telephone Line) /*0 is ONHOOK, 1 is OFFHOOK*/
                IF DIALTONE_FLAG indicates ONHOOK then
                  Do
                    Increment ON_HOOK_TIME_COUNTER
                    GOTO LOOPDT2
                  Done
                fi
                IF ON_HOOK_TIME_COUNTER > 800 then set BYPASS to 1
                fi
        Return
/***************************************************************************/
```

Figure 6c

```
/****************************************************************************/
SUBROUTINE: CAPTUREDIGITS
CAPTUREDIGITS:
        SETUP dtmf hardware for dtmf READ
        For I = 1 to 1700    /*Initialize Interdigit count down timer*/
          Get DIALTONE_FLAG from (Telephone Line) /*If not still OFFHOOK then EXIT to MAIN*/
           If DIALTONE_FLAG = 0 then GOTO MAIN
                fi
          POLL for dtmf tone from (DTMF RECEIVE CHIP)
           If tone not detected then NEXT I            /*Increment Interdigit count down timer*/
           else
            Increment NUMBER_OF_DIGITS_CAPTURED
            If NUMBER_OF_DIGITS_CAPTURED > (10 – NDX)  + 1 then GOTO MAIN
                             /*user dialed more than */
                             /*prefix digits plus user digits and does not need help here */
            READ dtmf tone into variable DTMF
         TELNO(NUMBER_OF_DIGITS_CAPTURED) = DTMF
        NEXT I
              /*Interdigit Timer has timed out, Check for number of digits received*/
        IF NUMBER_OF_DIGITS_CAPTURED  <  (10 – NDX) + 1  then
          Do
            If  telno(1) = 12 and telno(2) = 1 then
              Do                              /*User has requested to input options*/
                Gosub PARSEOPTIONS
                Goto MAIN                     /*Initialize with new user options*/
              Done
           Set NUMBER_OF_DIGITS_CAPTURED =  0
          Done
        Return
/****************************************************************************/
SUBROUTINE: PARSESTRING
         For j = NDX to 10
          DIAL_STRING(j) = TELNO(j – (NDX – 1))
         Next j
 Return                   /****************/
```

Figure 6d

```
SUBROUTINE: FLASHLINE
            Go ONHOOK
            Pause 600 msec                 '600 milliseconds, nominal, can be between 400 and
                                  '700ms
            Go OFFHOOK
      Return
/****************************************************************************/
/****************************************************************************/
SUBROUTINE: DIALNUMBER
      IF PRIVACY_BIT = 1 then
       Do
         DTMFOUT(*67)             /*Dial the Caller ID Block Code */
       Done
      IF PRIVACY_BIT = 0 then
       Do
         DTMFOUT(*82)             /*Dial the Caller ID Send Code*/
       Done
      IF ONE_PLUS_BIT = 1 then
       Do
         DTMFOUT(1)               /*Dial 1 before the area code, etc*/
       Done
      For DIGIT = 1 to 10
      DTMFOUT(DIALSTRING(DIGIT)) /*Dial the prefix code and the rest of the
                                           /*phone number*/
      Return
/****************************************************************************/
/****************************************************************************/
SUBROUTINE: PARSEOPTIONS
      Write to DisplayDevice("PRIVACY?: Y/N) /*Prompt for user to turn Call ID Block ON or */
                                       /*OFF*/
      Gosub CAPOPTIONSTRINGS      /*Get user input*/
      Write user input to EEPROM
      Read user input from EEPROM
      Write user input from EEPROM to DisplayDevice /*User selection confirmed on */
                                           /*DisplayDevice*/
```

Figure 6e

```
Write to DisplayDevice("1 PLUS ON?: Y/N) /*Prompt for user to turn 1 PLUS Dialing
                                                          /*ON or OFF*/
        Gosub CAPOPTIONSTRINGS      /*Get user input*/
        Write user input to EEPROM
         Read user input from EEPROM
         Write user input from EEPROM to DisplayDevice /*User selection confirmed  on*/
                                                        /*DisplayDevice*/
        Write to DisplayDevice("ENTER PREFIX# ) /*Prompt for user to enter dialing prefix*/
        Gosub CAPREFIXSTRING        /*Get user input of dialing prefix*/
        Write user input to EEPROM
        While user input from EEPROM <> 12
          Do
            Read user input from EEPROM
            Gosub CHECK_FOR_TEN
            Write user input from EEPROM to DisplayDevice /*User entry confirmed  on*/
                                                        /*DisplayDevice*/
  Done
        Return
/**************************************************************************/
SUBROUTINE: DISPLAYPREFIX
        READ PrefixData from EEPROM
        WRITE PrefixData from EEPROM to DisplayDevice
Return
/**************************************************************************/
SUBROUTINE: CAPOPTIONSTRINGS
        For I =1 to 1900            /* Time out if no user input*/
          When data present from DTMFreceiver
      Do
                READ data from DTMFreceiver into option_bit
                Return
            Done
        Next
Return
/**************************************************************************/
```

Figure 6f

```
SUBROUTINE: CAPREFIXSTRING
        Mu = 0
        For I =1 to 1900              /* Time out if no user input*/
          When data present from DTMFreceiver
         Do
                Mu = mu + 1
                READ data from DTMFreceiver into telno(mu)
                If  telno(mu) = 12  or  mu > 7 then
                  Return
                fi
            done
        Next
        Return
/***************************************************************************/
SUBROUTINE: GETNDX
for i = 1 to 7
  read from start of  prefix data from EEPROM into digit
  if digit = 12 then ret_ndx
next
return
ret_ndx:
ndx = I
return
/****************************************************************************/
SUBROUTINE: CHECK_FOR_TEN
if telno(i) = 10 then zeroit
return
zeroit:
telno(i) = 0                              /*Format output for DisplayDevice*/
return
/***************************************************************************/
```

Programmer Application Notes:

1. **Actual programming language used was Parallax, Inc. PBASIC**
2. Processor used was the Parallax, Inc. BASIC Stamp II, BS2-IC

Figure 6g

3. The Pause instruction argument is in milliseconds
4. The processor clock speed is approximately 20MHZ
5. The PBASIC interpreter executes approximately 3000 instructions per second, i.e. 0.3 milliseconds per instruction. Use the 0.3 milliseconds/instruction value to calculate timeouts and delays that are implemented using loops.
6. Contact the inventor for future development and application notes.

Figure 6h